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## (54) IMPROVEMENTS IN OR RELATING TO WEATHERSTRIPPING

(71) I, FREDERICK VICTOR CAUNTER, a British Subject, of 15 Elmle Drive, Olney, Buckinghamshire MK46 5HU, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates generally to weatherstrips and to a method and apparatus for making such weatherstrips.

Weatherstrips are used for sealing between two components of, for example, a window or a door. Such weatherstrips are known which comprise a longitudinal base of woven material into which are woven upstanding pile fibres which achieve the sealing. The base may be coated with plastics material to prevent fraying of the woven base when it is cut.

Commonly the weatherstrip is in use inserted in a complementary groove formed in an aluminium door or window frame.

In accordance with one aspect of the present invention, there is provided a method of forming a weatherstrip, comprising the steps of winding a plurality of plastics fibres progressively around a carrier, bonding an elongate base strip of plastics material to said fibres by ultra-sonic welding, and severing the fibres to provide generally U-shaped fibres bonded to the base.

Preferably the base strip and the fibres are formed of polypropylene.

In accordance with another aspect of the invention there is provided a weatherstrip comprising a base strip of plastics material to which have been bonded by ultra-sonic welding a plurality of fibres, the fibres being generally U-shaped and having their bases attached to the base strip.

In accordance with yet another aspect of the invention, there is provided an apparatus for forming a weatherstrip comprising means for wrapping a plurality of yarns around a carrier progressively along the length of the carrier, means for feeding the carrier having the yarns wound thereon to a bonding station, means for feeding a base strip to the bonding station to lie adjacent one edge of the carrier,

means for bonding the base strip to the yarns at the edge of said carrier at the bonding station by ultra-sonic welding, and means for cutting the yarns longitudinally of the carrier after bonding to provide generally U-shaped fibres bonded to the base.

A weatherstrip in accordance with the invention and an apparatus and method of manufacturing the same will now be described, by way of example, with reference to the accompanying drawings, in which:—

Figure 1 is a sectional view of the weatherstrip, and

Figure 2 is a diagrammatic representation of the apparatus illustrating the method of forming the weatherstrip.

Referring to Figure 1, the weatherstrip comprises a base strip 1 of plastics material, preferably non-woven and of polypropylene, having bonded thereto a dense array of generally U-shaped long pile fibres 2. Disposed centrally of the fibres between the arms of the U is a barrier 3 of flexible material, which is impervious or only slightly pervious to prevent or reduce the passage of water from one side of the weatherstrip to the other. The pile is located between elongate, longitudinally extending projections 4 on the base strip.

The fibres are preferably densely formed from a monofilament yarn of plastics material, preferably polypropylene, compatible with that of the base strip, the bases of the U-shaped fibres being bonded to the base strip by ultrasonic welding, as will be more fully described below.

Referring to Figure 2, the apparatus briefly comprises a carrier 5 in the form of an elongate metal band which is movable through a wrapping station 6, a bonding station 7, at which there is ultra-sonic welding apparatus, and a cutting or slitting station 8.

At the wrapping station 6, a strip 9 of barrier material is folded over the edges of the metal carrier band 5 as illustrated so that the strip 9 completely covers one surface of the band, the edges of the strip being spaced apart on the other surface of the band. The distance between the edges of the barrier

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strip 9 may be varied to suit any particular application.

After the barrier strip is secured to the band 5 a plurality of monofilament polypropylene yarns 10 are wound around the band 5, the yarns being continuous lengths arranged side-by-side to provide a dense coverage of the band and the barrier strip.

As the band passes to the bonding station 7 two continuous base strips 1 of backing material, which is compatible with the yarn and is also preferably of polypropylene, are fed to the bonding station and are positioned in contact with the yarns at the edges of the band. The band, including the barrier strip, the yarns and the base strips, is then subjected to ultrasonic welding at the bonding station 7 at which the yarns and the barrier strip are bonded to the base strips adjacent the edges of the metal band.

At cutting station 8 the yarn and strip is cut at 11 on both sides of the metal band to provide the strip illustrated in Figure 1 in which U-shaped fibres and the barrier strip are secured to the base section.

The cutters (not shown) are preferably adjustable so that the yarn can be cut at any desired distance from the base strips. Thereby the production of weatherstripping having two different heights of yarn or fibre is possible. Following the cutting of the fibres, the strips are coiled on to spools in continuous lengths in a manner which does not excessively crush the pile.

It will be appreciated that the barrier strip may be omitted, although it does provide better weather-proofing, and that if desired the barrier strip could extend completely around the metal bands so that two layers of barrier material of equal height are provided in the strip.

The retaining projections 4 act to centralise the pile and the barrier in the section define between the projections, the portions of the base strip laterally outwardly of the projections being free of pile to permit easy insertion into a complementary shaped recess in, for example, an aluminium window frame.

The above-described strip may have a pile of any desired height. The strip is flexible along its length and is readily inserted into a complementary groove or channel in, for example, a window or door frame.

Because the fibres are secured to the base strip at the base of the U-shape, bonding of substantial length of the fibre is attained.

Although the preferred material for both the base strip and the fibres has been described above as polypropylene, the base and the fibres may be of any suitable compatible material or materials.

#### WHAT I CLAIM IS:—

1. A method of forming a weatherstrip comprising the steps of winding a plurality of

plastics fibres progressively around a carrier, bonding an elongate base strip of plastics material to said fibres by ultra-sonic welding, and severing the fibres to provide generally U-shaped fibres bonded to the base.

2. A method according to claim 1, wherein the base strip is of non-woven material.

3. A method according to claim 1 or 2, wherein the carrier is an elongate band.

4. A method according to any of claims 1 to 3, wherein two said weatherstrips are formed simultaneously by bonding two spaced apart base strips to said fibres and severing the fibres between the base strips.

5. A method according to any of claims 1 to 4, wherein the carrier also carries a barrier strip which is wrapped at least partially round the carrier, and wherein the barrier strip is secured to the base strip or strips substantially centrally of the arms of the U-shaped fibres.

6. A method according to claim 5, wherein the barrier strip extends around only part of the carrier, the edges of the barrier strip being spaced apart.

7. A method according to claim 6, wherein the barrier strip is cut longitudinally.

8. A method according to any of the preceding claims, wherein the or each base strip has upstanding elongate projections between which the bases of the U-shaped fibres are located before bonding.

9. A weatherstrip comprising a base strip of plastics material to which have been bonded by ultra-sonic welding a plurality of fibres, the fibres being generally U-shaped and having their bases attached to the base strip.

10. A weatherstrip according to claim 9, wherein the base is of non-woven plastics material.

11. A weatherstrip according to claim 9 or 10, wherein the plastics material of the base strip and the fibres is polypropylene.

12. A weatherstrip according to any of claims 9 to 11, wherein the base strip has upstanding elongate projections which are spaced apart laterally of the base strip and inwardly of the edges of the base strip, the bases of the U-shaped fibres being located between the projections.

13. A weatherstrip according to any of claims 9 to 12, including a barrier strip which is located between the arms of the U-shaped fibres.

14. A weatherstrip according to claim 13, wherein the barrier strip has one upstanding arm which is of substantially the same height as the fibres and another upstanding arm which is of a height less than the height of the fibres.

15. An apparatus for forming a weatherstrip comprising means for wrapping a plurality of yarns around a carrier progressively along the length of the carrier,

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- means for feeding the carrier having the yarns wound thereon to a bonding station, means for feeding a base strip to the bonding station to lie adjacent one edge of the carrier, 5 means for bonding the base strip to the yarns at the edge of said carrier at the bonding station, by ultra-sonic welding, and means for cutting the yarns longitudinally of the carrier after bonding to provide generally U-shaped 10 fibres bonded to the base.
16. An apparatus according to claim 15, wherein said cutting means is arranged to cut the yarns on both sides of the carrier.
- 15 17. An apparatus according to claim 15 or 16, further including means for securing a barrier strip to said carrier before the yarn is wound on to the carrier and around the barrier strip.
- 20 18. An apparatus according to any of claims 15 to 17, wherein means are provided for securing a further base strip to the yarns at the other edge of said carrier to form two opposed weatherstrips simultaneously.
19. An apparatus according to any of claims 15 to 18, wherein the means for cutting 25 the yarns may be repositioned to alter the height of the fibres of the weatherstrip or weatherstrips.
20. A method of forming a weatherstrip according to claim 1 and substantially as herein 30 described.
21. A weatherstrip according to claim 9, constructed and arranged substantially as herein described with reference to the accom- 35 panying drawings.
22. An apparatus for forming a weatherstrip according to claim 15, constructed and arranged substantially as herein described with reference to Figure 2.

A. A. THORNTON & CO.,  
Chartered Patent Agents,  
Northumberland House,  
303/306 High Holborn,  
London, WC1V 7LE.

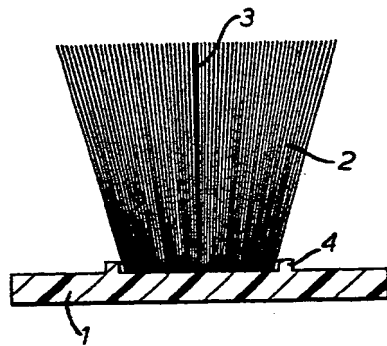
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COMPLETE SPECIFICATION

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Sheet 1



*Fig. 1.*

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COMPLETE SPECIFICATION

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Sheet 2

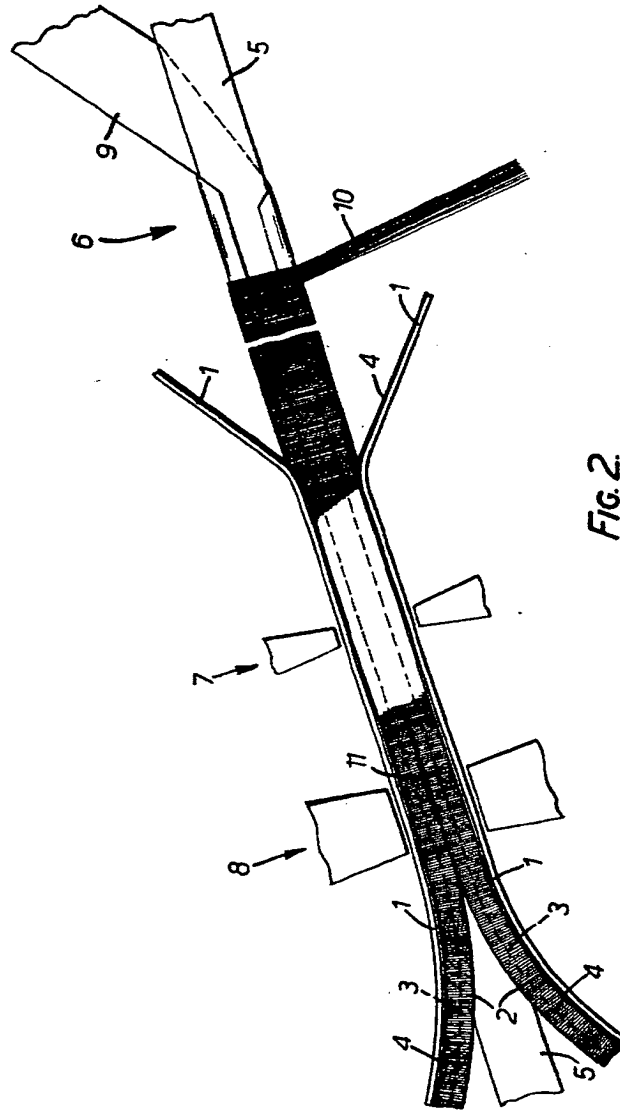


FIG. 2.

